INFLATABLE DEVICE FOR ADJUSTING THE SUPPORT AND COMFORT OF A MATTRESS

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The invention pertains to the field of mattresses and box springs. More particularly, the invention pertains to means for adjustment of firmness, support, and sag of a mattress.

DESCRIPTION OF RELATED ART

US Patent No. 4,745,645 to McWilliams discloses is an "Inflatable Insert for Worn Mattresses," which has three separate rectangular, flat, pleated pads. It does not teach a one-piece unit having a convex shape.

US Patent No. 5,070,559 to Pettifer discloses an "Adjustable Spinal Support," which is designed to help support the "lumbar region of a person's spine" and does not teach a convex shape.

US Patent No. 5,948,013 to Swezey *et al.* discloses a "Self-inflating Back Pillow and cold Therapy Device". While this patent teaches a convex shape, it is a much smaller device used to support the lumbar region of chairs.

US Patent No. 6,665,898 to Gordon teaches a "Device for correcting a Sagging Bed," which lacks the convex shape and a structural design to maintain the shape. It is also inflated through long tubes, while the device is inserted between the mattress and box springs.

In addition to the foregoing patents, many people put boards between the mattress and box spring to help bolster the firmness of a mattress.

Thus, the prior art teaches inflatable spinal supports, head supports and other devices used to help support specific areas of a bed. However, the prior art does not

appear to teach a support having a convex shape to create an adjustable area that supports the majority of a mattress. The prior art also lacks a structural design, which helps form and maintain the convex shape.

SUMMARY OF THE INVENTION

Briefly stated, an apparatus for adjusting the firmness, support, or sag of a mattress includes an inflatable device having a substantially convex cross-sectional shape that is thicker in the center region and gradually thinner toward the edges, a material and constitution for maintaining the convex shape under the weight of the mattress and a person, and a set of dimensions large enough to adjust firmness, support, or sag for the majority of an area of the mattress used by the person.

The invention provides an inflatable device that is placed between the mattress and box spring and enabling the user to adjust the firmness, support, and sag. The inflatable convex mattress adjustment device acts like a board that can be infinitely adjusted in the proper proportions (the convex shape).

Prior to the present invention, there has been no inexpensive way to adjust the support, comfort, and sag of a conventional mattress. After experimenting with different prototypes, it became apparent to this inventor that a convex shape is highly desirable, and an inflatable device without controls to maintain the convex shape would not be stable.

The preferred embodiment includes three distinguishing features:

1) A convex shape – this device generally is thicker in the center area and gradually tapered at the edges.

2) Means for maintaining the convex shape – this device is designed using one or more of the methods disclosed herein to maintain the convex shape, while the uneven pressure of a mattress and occupant press on it.

3) A single device generally controls the firmness, support, and sag of the majority of a single sleeping area. That is, not just the head region, spine

region or leg region, but the majority of the area that gets depressed as a person lies upon a mattress.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows the basic convex shape of the preferred embodiment (from the side), wherein the diameter in the center 1 is the thickest. Closer to the edges 2 the device gets thinner, and at the edges 3 the device is the thinnest.

Fig. 2A shows the concave shape 8 of the top surface of a mattress 6 that is either sagging or has weight applied to it. The amount of depression in the center area 5 is greater than the amount of depression towards the edges 4.

Fig. 2B shows that the convex shape of the invention 7 closely matches the concave shape 8 of the depressed mattress 6.

Fig. 2C shows the invention 7 placed between the mattress 6 and box spring 9, providing proper support throughout the mattress surface.

Fig. 3A and 3B show that when uneven pressure (greater pressure 12 and less pressure 13) is applied to the surface of the mattress 14, a device 11 with no method of maintaining shape would squish and bulge between the mattress 14 and box spring 10. This would cause any such device to be ineffective.

Fig. 4A shows a side view of a single-chambered embodiment of the present invention 14 with interior expansion limiters 15 made of a flexible material. This embodiment includes a single opening 14a for inflation. This illustration also shows how the pieces of flexible material used to limit the expansion of the device must be longer in the center region (allowing for greater expansion) and shorter towards the edges (allowing less expansion).

Fig. 4B is a close up cross-section view of one possible method for attaching pieces of material 15 to the top and bottom surfaces of the device 14. The attachment of the material 15 to the interior of the device 14 is shown at 15A.

Fig. 4C is a top view of the embodiment shown in Fig. 4B. It shows how the pieces of flexible material 15 might be arranged within the device 14 to allow the entire chamber to be filled from one inflation opening 14a.

Fig. 5A shows a side view of an alternative single-chambered embodiment of the invention 16. This embodiment uses hollow chambers 17 that connect the top surface to the bottom surface. This embodiment has a single opening 16A for inflation. The hollow chambers 17 limit the expansion of the device at various locations to maintain the convex shape.

Fig. 5B is a close up cross-section view of the embodiment shown in Fig. 5A that more clearly shows the hollow chambers 17. The outside edge of the device is shown at 16.

Fig. 5C is a top view of the embodiment shown in Fig. 5A and 5B. It shows one optional arrangement of the hollow chambers 15 within the device 16 to allow the entire chamber to be filled from one inflation opening 16a.

Fig. 6A is a side view of a third embodiment. This embodiment includes multiple chambers 19 of varying size to create a shape 18 that approximates the convex shape shown in figure 1 with larger chambers 19 near the center of the device. Each chamber has an inflation opening 21 to allow for added adjustability.

Fig. 6B is a close-up cutaway view of one method of attaching the chambers 20, showing a single (although it could be multiple) strip(s) of material 23 connecting the chambers.

Fig. 6C is a close-up cutaway view of an alternative method of attaching the chambers 20, showing the chambers attached along the sides 24 of the chambers themselves.

Fig. 6D is a top view of an alternative embodiment 22 with the smaller chambers 19A near the perimeter and the larger chambers 19 near the center. This figure also shows the individual openings 21 for adding air.

Fig. 7A is a top view of an oval-shaped embodiment 27 laid on top of a single sized box spring 25. The shape should cover the majority (>50%) of the surface area 26 of a

typical single box spring. Viewed from the side, the device still has the convex shape, but the outer shape can be in many forms.

Fig. 7B is a top view of a rectangle-shaped embodiment 28 laid on top of a single sized box spring 25. The shape should cover the majority (>50%) of the surface area 26 of a typical single box spring. Viewed from the side the device still has the convex shape, but the outer shape can be in many forms.

Fig. 7C is a top view of a rounded rectangle-shaped embodiment 29 laid on top of a single sized box spring 25. The shape should cover the majority (>50%) of the surface area 26 of a typical single box spring. Viewed from the side the device still has the convex shape, but the outer shape can be in many forms.

Fig. 7D is a top view of a rounded diamond-shaped embodiment 30 laid on top of a single sized box spring 25. The shape should cover the majority (>50%) of the surface area 26 of a typical single box spring. Viewed from the side the device still has the convex shape, but the outer shape can be in many forms.

Fig. 8A is a perspective view of a king-size mattress 32 and box spring 31. A typical king-size bed normally would require two devices 33 (one for each side). This allows each side to be individually adjusted (inflated).

Fig. 8B is a perspective view of a queen or full-size mattress 32 and box spring 31. A typical queen or full-size bed normally would require two devices 33 (one for each side). This allows each side to be individually adjusted (inflated). The devices may overlap on their thinner edges.

Fig. 8C is a perspective view of a twin or single-size mattress 32 and box spring 31. A typical twin or single size bed normally would require only one device 33.

DETAILED DESCRIPTION OF THE INVENTION

The invention provides a convex-shaped, inflatable mattress support (see Fig. 1), with a structural design to help form and maintain the convex shape. The device is

designed to adjust the firmness and support of the general area of a mattress, not just a specific area of the body, such as the head or spine.

When looked at from the side (see Fig. 1), the convex shape would be widest in the middle and tapered towards the perimeter. This shape closely matched the concave shape of a sagging mattress or a mattress with the weight of a human applied. (see Fig. 2A and 2B)

This invention would include structural design to help maintain the convex shape. Without such a structure, a device of that size would squish and bulge, making the device unstable and ineffective. (see Fig. 3A and 3B).

One structural design used to help maintain the shape of the device is shown in Fig. 4A-4C. These figures depict pieces of flexible material connected the top and bottom of the device through the inside of the chamber. Towards the edges of the device the strips of material would be short, so that the device could only expand a few centimeters. The strips of material would become longer towards the center of the device, allowing the middle portion to expand the widest. The pieces of material may be arranged in any pattern such as long strips, straight rows of strips, spiral rows of strips, or concentric circles of short strips as shown in figure 4C, as long as they help form the convex shape. This method uses a single air valve/spout, so that any internal structure would not impede air from filling the entire device from a single point.

Another structural design used to help maintain the shape of the device is shown in Fig. 5A-5C. These figures depict hollow chambers that connected the top and bottom of the device through the inside of the main chamber. Towards the edges of the device the hollow chambers would be short, so that the device could only expand a few centimeters. The hollow chambers would become longer towards the center of the device, allowing the middle portion to expand the widest. The hollow chambers may be arranged in any pattern such as spiral rows of strips, concentric circles, or a less defined pattern like the one depicted in figure 5C, as long as they help form the convex shape. This method uses a single air valve/spout, so that any internal structure would not impede air from filling the entire device from a single point.

The third method of maintaining the convex shape is to use multiple chambers of varying diameters. This would require 2 or more separate chambers. The example in figure 6D uses 11 separate chambers. The more chambers that are used, the more stable the device is and the more adjustable the device is. But a device with fewer chambers is easier for consumers to understand and use. A device with between 7 and 12 chambers might be the best mix of adjustability and ease of use. The important characteristic if this method is that the diameters of the chambers near the parameter are narrower than those toward the center as shown in figures 6A and 6D. This produces a device that closely forms the convex shape as shown in 18 of Fig. 6A. These chambers can be attached by a small area of material as shown in figure 6B, or the chambers can be directly connected as shown in figure 6C.

From the top, all of the previous examples show an oval shaped device, but as long as the device is convex from the side the shape as viewed from the top does not matter. Figures 7A-7D show some examples of acceptable shapes as viewed from the top. One key feature is that the area covered by the device should generally cover most of the surface of a standard twin or single bed (not just the center). The device should be of sufficient size as to adjust the support of a twin or single size bed. (see Fig. 8C) Two devices would be used on a king size bed (one on each side as shown in Fig. 8A). A full or queen size bed would also use two devices, although they my overlap in the center as shown in figure 8B.

Whether it is a single chamber device with a single air intake point or a multiple chambered device with multiple air intake points, the device may be inflated partially or fully to achieve the desired firmness and support.

Accordingly, it is to be understood that the embodiments of the invention herein described are merely illustrative of the application of the principles of the invention. Reference herein to details of the illustrated embodiments is not intended to limit the scope of the claims, which themselves recite those features regarded as essential to the invention.